EXPERIMENTAL NOTES OF The Mechanical Origine OR *PRODUCTION* OF FIXTNESS.

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OF
The Mechanical Origine
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FIXTNESS.

CHAP. I.

FIXITY being the oppoſite Quality to Volatility, what we have diſcourſed about the latter, will make the nature of the former more eaſily underſtood, and upon that account allow me to make ſomewhat the quicker diſpatch of what I have to ſay of it.

The Qualifications that conduce moſt to the *Fixity* of a portion of matter, ſeem to be theſe.

Firſt, the *groſsneſs* or the bulk of the corpuſcles it conſiſts of. For if theſe be too big, they will be too unwieldy and unapt to be carried up into the Air by the action of ſuch minute particles as thoſe of the Fire, and will alſo be unfit to be buoyed up by the weight of the Air; as we ſee, that Vapours, whilſt they are ſuch, are ſmall enough to ſwim in the Air, but can no longer be ſuſtained by it, when they convene into drops of rain or flakes of ſnow. But here it is to be obſerved, that when I ſpeak of the corpuſcles that a fixt body conſiſts of, I mean not either its Elementary or its Hypoſtatical Principles, as ſuch, but onely thoſe very little maſſes or cluſters of particles, of what kind ſoever they be, that ſtick ſo firmly to one another, as not to be diviſible and diſſipable by that degree of fire in which the body is ſaid to be fixt; ſo that each of thoſe little Concretions,

ons, though it may it ſelf be made up of two, three, or more particles of a ſimpler nature, is conſidered here *per modum Unius*, or as one intire corpuſcle. And this is one Qualification conducive to the Fixtneſs of a body.

The *next* is the *ponderouſneſs* or ſolidity of the corpuſcles it is made up of. For if theſe be very ſolid, and (which ſolid and compact bodies uſually are) of a conſiderable *ſpecifick* gravity, they will be too heavy to be carried up by the *effluvia* or the action of the fire, and their ponderouſneſs will make them as unwieldy, and indiſpoſed to be elevated by ſuch Agents, as the groſſneſs of their bulk would make bigger corpuſcles, but of a proportionably inferiour ſpecifick weight. On which account the *calces* of ſome metals and minerals, as Gold, Silver, &c. though, by the operation of Solvents, or of the fire, or of both, reduced to powders exceedingly ſubtile, will reſiſt ſuch vehement fires, as will eaſily drive up bigger, but leſs heavy and compact, corpuſcles, than thoſe *calces* conſiſt of.

The *third* Qualification that conduces to the Fixity of a body, belongs to its *Integral parts*, not barely as they are ſeveral parts of it, but as they are aggregated or contexed into one body. For, the Qualification, I mean, is the ineptitude of the component corpuſcles for avolation, by reaſon of their branchedneſs, irregular figures, crookedneſs, or other inconvenient ſhape, which intangles the particles among one another, and makes them difficult to be extricated; by which means, if one of them do aſcend, others, wherewith 'tis complicated, muſt aſcend with it; and, whatever be the account on which divers particles ſtick firmly together, the aggregate will be too heavy or unwieldy to be raiſed. Which I therefore take notice of, becauſe that, though uſually 'tis on the roughneſs and irregularity of corpuſcles, that their coheſion depends; yet it ſometimes happens, that the ſmoothneſs and flatneſs of their ſurfaces makes them ſo ſtick together, as to reſiſt a total divulſion; as may be illuſtrated by what I have ſaid of the coheſion of poliſhed marbles and the plates of glaſs, and by the fixity of glaſs it ſelf in the fire.

From this account of the Cauſes or Requiſites of Fixity, may be deduced the following means of giving or adding Fixation to a body, that was before either Volatile, or leſs fixt. Theſe means may be reduced to two general Heads; ***Firſt***, the action of the Fire, as the parts of the body, expoſed to it, are thereby made to operate variouſly on one another. And ***next***, the aſſociation of the particles of a volatile body with thoſe of ſome proper additament: Which term, [*of proper*] I rather imploy than that, one would expect, [*of fixt*;] becauſe 'twill ere long appear, that, in certain caſes, ſome volatile bodies may more conduce to the fixation of other volatile bodies, than ſome fixt ones doe. But theſe two Inſtruments of Fixation being but general, I ſhall propoſe four or five more particular ones.

CHAP. II.

AND *firſt*, in ſome caſes it may conduce to Fixation, that, either by an additament, or by the operation of the fire, the parts of a body be brought to touch each other in large portions of their ſurfaces. For, that from ſuch a contact there will follow ſuch a mutual coheſion, as will at leaſt indiſpoſe the touching corpuſcles to ſuffer a total divulſion, may appear probable from what we lately noted of the coheſion of pieces of marble and glaſs, and from ſome other *Phænomena* belonging to the Hiſtory of *Firmneſs*, from which we may properly enough borrow ſome inſtances, at leaſt for illuſtration, in the Doctrine of *Fixtneſs*, in regard that uſually, though not always, the ſame things that make a body *Firm*, give it ſome degree of *Fixity*, by keeping it from being diſſipated by the wonted degrees of Heat, and Agitation it meets with in the Air. But to return to the contact we were ſpeaking of, I think it not impoſſible, (though you may perhaps think it ſtrange,) that the bare operation of the Fire may, in ſome caſes, procure a *Coheſion* among the particles, (and conſequently make them more Fixt,) as well as in others disjoyn them, and thereby make them more *Volatile*. For, as in ſome bodies, the figures and ſizes of the corpuſcles may be ſuch, that the action of the fire may rub or tear off the little beards or hooks, or other particles that intangle them, and by that means make it more eaſie for the corpuſcles to be disingaged and fly upwards; ſo in other bodies, the ſize and ſhape of the corpuſcles may be ſuch, that the agitation, cauſed by the fire, may rub them one againſt the other, ſo as by mutual attrition to grind, as 'twere, their ſurfaces, and make them ſo broad and ſmooth, if not alſo ſo flat, as that the contact of the corpuſcles ſhall come to be made according to a large portion of their ſuperficies, from whence will naturally follow a firm Coheſion. Which I ſhall illuſtrate by what we may obſerve among thoſe that grind glaſſes for Teleſcopes and Microſcopes. For, theſe Artificers, by long rubbing a piece of glaſs againſt a metalline Diſh or concave Veſſel, do by this attrition at length bring the two bodies to touch one another in ſo many parts of their congruous ſurfaces, that they will ſtick firmly to one another, ſo as ſometimes to oblige the Work-man to uſe violence to disjoyn them. And this inſtance (which is not the ſole I could alleage) may ſuffice to ſhew, how a Coheſion of corpuſcles may be produced by the mutual adaptation of their congruous ſurfaces. And if two groſſer corpuſcles, or a greater number of ſmaller, be thus brought to ſtick together, you will eaſily believe, their Aggregate will prove too heavy or unwieldy for avolation. And to ſhew, that the fire may effect a lævigation in the ſurfaces of ſome corpuſcles, I have ſometimes cauſed *Minium*, and ſome other *calces*, that I judged convenient, to be melted for a competent time, in a vehement fire conveniently adminiſtred; whereby, according to expectation, that which was before a dull and incoherent powder, was reduced into much groſſer corpuſcles, multitudes of whoſe grains appeared ſmooth, glittering, and almoſt ſpecular, like thoſe of fine litharge of gold; and the maſſes that theſe grains compoſed, were uſually ſolid enough and of difficult fuſion. And when we make glaſs of Lead *per ſe*, (which I elſewhere teach you how to doe,) 'tis plain, that the particles of the Lead are reduced to a great ſmoothneſs; ſince, whereſoever you break the glaſs, the ſurfaces, produced at the crack, will not be jagged, but ſmooth, and conſiderably ſpecular.

lar. Nor do I think it impoſſible, that, even when the fire does not make any great attrition of the Corpuſcles of the body to be fixt, it may yet occaſion their ſticking together, becauſe by long tumbling them up and down in various manners, it may at length, after multitudes of revolutions and differing occurſions, bring thoſe of their ſurfaces together, which, by reaſon of their breadth, ſmoothneſs, or congruity of figure, are fit for mutual coheſion; and when once they come to ſtick, there is no neceſſity, that the ſame cauſes, that were able to make them paſs by one another, when their contact was but according to an inconſiderable part of their ſurfaces, ſhould have the ſame effect now, when their contact is full; though perhaps, if the degree of fire were much increaſed, a more vehement agitation would ſurmount this coheſion, and diſſipate again theſe cluſters of coaleſcent corpuſcles.

Theſe conjectures will perhaps appear leſs extravagant, if you conſider what happens in the preparation of Quick-ſilver præcipitated *per ſe.* For there, running Mercury, being put into a conveniently ſhaped Glaſs, is expoſed to a moderate fire for a conſiderable time: (For I have ſometimes found ſix or ſeven weeks to be too ſhort a one.) In this degree of fire the parts are variouſly tumbled, and made many of them to aſcend, till convening into drops on the ſides of the glaſs, their weight carries them down again; but at length, after many mutual occurſions, if not alſo attritions, ſome of the parts begin to ſtick together in the form of a red powder, and then more and more Mercurial particles are faſtened to it, till at length all, or by much the greater part of the Mercury, is reduced into the like *Præcipitate*, which, by this coheſion of the parts, being grown more fixt, will not with the ſame degree of Heat be made to riſe and circulate, as the Mercury would before; and yet, as I elſewhere note, I have

I have found by trial, that, with a greater and competent degree of heat, this *Præcipitate per ſe*, would, without the help of any volatilizing additament, be eaſily reduced into running Mercury again. Chymiſts and Phyſicians, who agree in ſuppoſing this *Præcipitate* to be made without any additament, will perchance ſcarce be able to give a more likely account of the conſiſtency and degree of Fixity that is obtained in the Mercury; in which, ſince no body is added to it, there appears not to be wrought any but a *Mechanical* change. And though, I confeſs, I have not been without ſuſpicions, that in Philoſophical ſtrictneſs this *Præcipitate* may not be made *per ſe*, but that ſome penetrating igneous particles, eſpecially ſaline, may have aſſociated themſelves with the Mercurial Corpuſcles; yet even upon this ſuppoſition it may be ſaid, that theſe particles contribute to the effect that is produced, but by facilitating or procuring, by their opportune Interpoſition, the mutual Coheſion of Corpuſcles that would not otherwiſe ſtick to one another.

Perhaps it will not be altogether impertinent to add, on this occaſion, that,as for the generality of Chymiſts, as well others as *Helmontians*, that aſſert the Tranſmutation of all metalls into Gold by the Philoſopher's Stone, me thinks,they may grant it to be probable, that a new and fit Contexture of the parts of a volatile body may, eſpecially by procuring a full contact among them, very much contribute to make it highly fixt. For, to omit what is related by leſs credible Authours, 'tis averred, upon his own trial, by *Helmont*, who pretended not to the Elixir, that a grain of the powder, that was given him, tranſmuted a pound (if I miſ-remember not) of running Mercury; where the proportion of the Elixir to the Mercury was ſo inconſiderable, that it cannot reaſonably be ſuppoſed, that every Corpuſcle of the Quick-ſilver, that before was volatile, was made extreamly fixt meerly by its Coalition with a particle of the powder, ſince, to make one grain ſuffice for this Coalition, the parts it muſt be divided into muſt be ſcarce conceivably minute, and therefore each ſingle part not likely to be fixt it ſelf, or at leaſt more likely to be carried up by the vehemently agitated Mercury, than to reſtrain that from avolation; whereas, if we ſuppoſe the Elixir to have made ſuch a commotion among the corpuſcles of the Mercury, as (having made them perhaps ſomewhat change their figure, and expelled ſome inconvenient particles,) to bring them to ſtick to one another, according to very great portions of their ſurfaces, and intangle one another, it will not be diſagreeable to the Mechanical Doctrine of Fixity, that the Mercury ſhould endure the fire as well as Gold, on the ſcore of its new Texture, which, ſuppoſing the ſtory true, appears to have been introduced, by the new colour, ſpecifick gravity, Indiſſolubleneſs in Aqua ſortis, and other Qualities wherein Gold differs from Mercury, eſpecially Malleableneſs, which, according to our Notes about that Quality, uſually requires that the parts, from whoſe union it reſults, be either hooked, branched, or otherwiſe adapted and fitted to make them take faſt hold of one another, or ſtick cloſe to one another. And ſince, in the whole maſs of the factitious Gold, all ſave one grain muſt be materially the ſame body, which, before the projection was made, was Quickſilver, we may ſee how great a proportion of volatile matter may, by an inconſiderable quantity of fixing additament, acquire ſuch a new Diſpoſition of its parts, as to become moſt fixt. And however, this Inſtance will agree much better with the Mechanical Doctrine about Fixity, than with that vulgar Opinion of the Chymiſts, (wherewith 'twill not at all comply,) That if, in a mixture, the volatile part do much exceed the fixt, it will carry up that, or at leaſt a good portion thereof, with it; and on the contrary. But though this Rule holds in many caſes, where there is no peculiar indiſpoſition to the effect that is aimed at; yet if the Mechanical affections of the bodies be ill ſuited to ſuch a purpoſe, our Philoſophical Experiment manifeſtly proves, that the Rule will not hold, ſince ſo great a multitude of grains of Mercury, in ſtead of carrying up with them one grain of the Elixir, are detained by it in the ſtrongeſt fire. And thus much for the firſt way of fixing Volatile Bodies.

CHAP. III.

THE *ſecond* way of producing *Fixity*, is by expelling, breaking, or otherwiſe diſabling thoſe volatile Corpuſcles that are too indiſpoſed to be fixt themſelves, or are fitted to carry up with them ſuch particles as would not, without their help, aſcend. That the Expulſion of ſuch parts is a proper means to make the aggregate of thoſe that remain more fixt, I preſume you will not put me ſolicitouſly to prove; and we have a manifeſt inſtance of it in *Soot*, where, though many active parts were by the violence of the fire and current of the air carried up together by the more volatile parts; yet, when Soot is well diſtilled in a Retort, a competent time being given for the extricating and avolation of the other parts, there will at the bottom remain a ſubſtance that will not now fly away, as it formerly did. And here let me obſerve, that the receſſe of the fugitive corpuſcles may contribute to the fixation of a body, not barely becauſe the remaining matter is freed from ſo many unfixt, if not alſo volatilizing, parts; but, as it may often happen, that upon their receſſe the pores or intervals, they left behind them, are filled up with more ſolid or heavy matter, and the body becomes, as more homogeneous, ſo more cloſe and compact. And whereas I intimated, that, beſides the expulſion of unfit corpuſcles, they may be otherwiſe diſabled from hindering the fixation of the maſſe they belong to, I did it, becauſe it ſeems very poſſible, that in ſome caſes they may, by the action of the fire, be ſo broken, as with their fragments to fill up the pores or intervals of the body they appertained to; or may make ſuch coalitions with the particles of a convenient additament, as to be no impediment to the Fixity of the whole maſſe, though they remain in it. Which poſſibly you will think may well happen, when you ſhall have peruſed the Inſtances annext to the *fourth* way of fixing bodies.

The *third* means of fixing, or leſſening the Volatility of, bodies, is by preſerving that reſt among the parts, whoſe contrary is neceſſary to their Volatilization. And this may be done by preventing or checking that Heat, or other motion, which external Agents ſtrive to introduce into the parts of the propoſed body. But this means tending rather to hinder the actual avolation of a portion of matter, or, at moſt, procure a temporary abatement of its volatility, than to give it a ſtable fixity, I ſhall not any longer inſiſt on it.

The *fourth* way of producing Fixity in a body, is by putting to it ſuch an appropriated Additament, whether *fixt* or *volatile*, that the Corpuſcles of the body may be put among themſelves, or with thoſe of the additament, into a complicated ſtate, or intangled contexture. This being the uſual and principal way of producing Fixity, we ſhall dwell ſomewhat the longer upon it, and give Inſtances of ſeveral degrees of Fixation. For, though they do not produce that quality in the ſtricteſt acceptation of the word, *Fixity*; yet 'tis uſefull in our preſent inquiry, to take notice, by what means that volatility comes to be *gradually* abated, ſince that may facilitate our underſtanding, how the Volatility of a body comes to be *totally* abated, and conſequently the body to be fixt.

CHAP. IV.

AND *firſt* we find, that a fixt additament, if its parts be conveniently ſhaped, may eaſily give a degree of fixity to a very volatile body. Thus *Spirit of Nitre*, that will of it ſelf eaſily enough fly away in the Air, having its ſaline particles aſſociated with thoſe of *fixt Nitre*, or *ſalt* of *Tartar*, will with the Alkaly compoſe a ſalt of a Nitrous nature, which will endure to be melted in a Crucible without being deprived even of its Spirits. And I have found, that the ſpirits of Nitre, that abound in *Aqua fortis*, being concoagulated with the Silver they corrode, though one would not expect that ſuch ſubtile Corpuſcles ſhould ſtick faſt to ſo compact and ſolid a body as Silver; yet Cryſtalls, produced by their

Coalition, being put into a Retort, may be kept a pretty while in fuſion, before the metal will let go the Nitrous ſpirits. When we poured *Oil* of Vitriol upon the *Calx* of Vitriol, though many Phlegmatick and other Sulphureous particles were driven away by the excited Heat; yet the ſaline parts, that combined with the fixt ones of the Colcothar, ſtuck faſt enough to them, not to be eaſily driven away. And if *Oil of Vitriol* be in a due proportion dropt upon *Salt of Tartar*, there reſults a *Tartarum vitriolatum*, wherein the acid and alkalizate parts cohere ſo ſtrongly, that 'tis not an ordinary degree of fire will be able to disjoyn them. Inſomuch that divers Chymiſts have (though very erroniouſly) thought this compounded Salt to be indeſtructible. But a leſs heavy liquour than the ponderous Oil of Vitriol may by an Alkaly be more ſtrongly detained than that Oil it ſelf; experience having aſſured me, that *Spirit of Salt* being dropt to ſatiety upon a *fixt*

Alkaly, (I uſed either that of Nitre or of Tartar,) there would be made ſo ſtrict an union, that, having, without additaments, diſtilled the reſulting ſalt with a ſtrong and laſting fire, it appeared not at all conſiderably to be wrought upon, and was not ſo much as melted.

But 'tis not the bare Mixture or Commiſtion of Volatile particles with Fixt ones, (yea though the former be predominant in quantity,) that will ſuffice to elevate the latter. For, unleſſe the figures of the latter be congruous and fitted to faſten to the other, the volatile parts will fly away in the Heat, and leave the reſt as fixt as before; as when ſand or aſhes are wetted or drenched with water, they quickly part with that water, without parting with any degree of their Fixity. But on the other ſide, it is not always neceſſary, that the body, which is fitted to deſtroy, or much abate, the volatility of another ſubſtance, ſhould be it ſelf fixt. For, if there be a skilful or lucky coaptation of the figures of the particles of both the bodies, theſe particles may take ſuch hold of one another, as to compoſe corpuſcles, that will neither by reaſon of their ſtrict union be divided by Heat; nor by reaſon of their reſulting groſsneſs be elevated even by a ſtrong fire, or at leaſt by ſuch a degree of Heat as would have ſufficed to raiſe more indiſpoſed bodies than either of the ſeparate Ingredients of the mixture. This obſervation, if duly made out, does ſo much favour our Doctrine about the *Mechanical* Origine of Fixation, and may be of ſuch uſe, not onely to *Chymiſts*, in ſome of their operations, but to *Philoſophers*, in aſſigning the cauſes of divers *Phænomena* of Nature, that it may be worth while to exemplifie it by ſome Inſtances.

The firſt whereof I ſhall take from an uſual practice of the Chymiſts themſelves; which I the rather doe, to let you ſee, that ſuch known Experiments are too often over-looked by them that make them, but yet may hint or confirm Theories to thoſe that reflect on them. The Inſtance, I here ſpeak of, is that which is afforded by the vulgar Preparation of *Bezoardicum Minerale*. For, though the rectified *Butter* or Oil of *Antimony* and the *Spirit* of *Nitre*, that are put together to make this white *Præcipitate*, are both of them diſtilled liquours; yet the copious powder, that reſults from their Union, is, by that Union of volatile parts, ſo far fixt, that, after they have edulcorated it with water, they preſcribe the calcining of it in a Crucible for five or ſix hours: which operation it could not bear, unleſs it had attained to a conſiderable fixation. This diſcourſe ſuppoſes with the generality of Chymiſts, that the addition of a due quantity of ſpirit of Nitre, is neceſſary to be employed in making the *Bezoardicum Minerale*. But if it be a true Obſervation, which is attributed to the Learned *Guntherus Billichius*, (but which I had no Furnace at hand to examine when I heard of it,) if, I ſay, it be true, that a *Bezoardicum Minerale* may be obtained, without ſpirit of Nitre, barely by a ſlow evaporation, made in a Glaſſe-diſh, of the more fugitive parts of the Oil of Antimony; this Inſtance will not indeed be proper in this place, but yet will belong to the *ſecond* of the foregoing ways of introducing Fixity. I proceed now to alleage other particulars in favour of the above-mentioned Obſervation.

If you take ſtrong *Spirit* of *Salt*, that, when the Glaſs is unſtopt, will ſmoak of it ſelf in the cold air, and ſatiate it with the volatile *Spirit* of *Urine*, the ſuperfluous moiſture being abſtracted, you will obtain by this preparation (which, you may remember, I long ſince communicated to you, and divers other *Virtuoſi*.) a compounded Salt, ſcarce, if at all, diſtinguiſhable from *Sal Armoniac*, and which will not, as the Salts it conſiſts of will doe, before their coalition, eaſily fly up of it ſelf into the air, but will require a not deſpicable degree of fire to ſublime it.

Of theſe ſemivolatile Compoſitions of Salt I have made, and elſewhere mentioned, others, which I ſhall not here repeat, but paſſe on to other Inſtances pertinent to our preſent deſign.

I lately mentioned, that the Volatility of the ſpirits of Nitre may be very much abated, by bringing them to coagulate into Cryſtalls with particles of corroded Silver; but I ſhall now add, that I gueſſed, and by trial found, that theſe Nitrous ſpirits may be made much more fixt by the addition of the Spirit of Salt, which, if it be good, will of it ſelf ſmoak in the Air. For, having diſſolved a convenient quantity of Cryſtalls of Silver in diſtilled water, and precipitated them, not with a *Solution* of Salt, but the *Spirit* of Salt; the phlegm being abſtracted, and ſome few of the looſer ſaline particles; though the remaining maſſe were preſt with a violent fire that kept the Retort red-hot for a good while; yet the Nitrous and Saline ſpirits would by no means be driven away from the Silver, but continued in fuſion with it; and when the maſſe was taken out, theſe Spirits did ſo abound in it, that it had no appearance of a Metal, but looked rather like a thick piece of Horn.

The next Inſtance I ſhall name is afforded us by that kind of *Turbith*, which may be made by *Oil of Vitriol*, in ſtead of the *Aqua fortis* imployed in the common *Turpethum Minerale*. For, though Oil of Vitriol be a diſtilled liquour, and Mercury a body volatile enough; yet, when we abſtracted four or five parts of Oil of Vitriol from one of Quick-ſilver, (eſpecially if the operation were repeated,) and then waſhed off as much as we could of the ſaline particles of the Oil of Vitriol; yet thoſe that remained adhering to the Mercury made it far more fixt, than either of the liquours had been before, and inabled it even in a Crucible to endure ſuch a degree of fire, before it could be driven away, as, I confeſs, I ſomewhat wondered at. The like *Turbith* may be made with Oil of Sulphur *per Campanam.* But this is nothing to what *Helmont* tells us of the operation of his *Alkaheſt*, where he affirms, that that *Menſtruum*, which is volatile enough, being abſtracted from running Mercury, not onely coagulates it, but leaves it fixt, ſo that it will endure the brunt of fires acuated by Bellows, (*omnem follium ignem.*) If this be certain, it will not be a ſlender proof, that *Fixity* may be *Mechanically* produced; and however, the Argument will be good in reference to the *Helmontian* Spagyriſts. For if, as one would expect, there do remain ſome particles of the *Menſtruum* with thoſe of the metal, it will not be denied, that two volatile ſubſtances may perfectly fix one another. And if, as *Helmont* ſeems to think, the *Menſtruum* be totally abſtracted, this ſuppoſition will the more favour our Doctrine about *Fixity*; ſince, if there be no material additament left with the Quick-ſilver, the Fixation cannot ſo reaſonably be aſcribed to any thing, as to ſome new Mechanical modification, and particularly to ſome change of Texture introduced into the Mercury it ſelf.

And that you may think this the leſs improbable, I will now proceed to ſome Inſtances, whereof the firſt ſhall be this; That, having put a mixture made of a certain proportion of two dry, as well as volatile, bodies, (*viz.* Sal Armoniac, and Flower or very fine powder of Sulphur,) to half its weight of common running Mercury, and elevated this mixture three or four times from it, (in a conveniently ſhaped, and not over-wide, glaſs) the Mercury, that lay in the bottom in the form of a ponderous and ſomewhat purpliſh powder, was, by this operation, ſo fixt, that it long endured a ſtrong fire, which at length was made ſo ſtrong, that it melted the Glaſs, and kept it melted, without being ſtrong enough to force up the

Mercury: which, by ſome trials, not ſo proper to be here mentioned, ſeemed to have its ſalivating and emetick powers extraordinarily infringed, and ſometimes quite ſuppreſſed. But this onely upon the bye. In all the other Inſtances, (wherewith I ſhall conclude theſe Notes,) I ſhall employ one *Menſtruum*, Oil of Vitriol, and ſhew you the efficacy of it in fixing ſome parts of volatile bodies with ſome parts of it ſelf; by which examples it may appear, that a Volatile body may not onely leſſen the volatility of another body, as in the lately mentioned caſe of our ſpirituous *Sal Armoniac*; but that two Subſtances, that apart were volatile, may compoſe a third, that will not onely be leſs volatile, but conſiderably (if not altogether) fixt.

We mixed then, by degrees, about equal parts of *Oil* of *Vitriol* and *Oil* of *Turpentine*: and though each of them ſingle, eſpecially the latter, will aſcend with a moderate fire in a Sand-furnace; yet, after the Diſtillation was ended, we had a conſiderable quantity, ſometimes (if I miſremember not) a fifth or ſixth part, of a *Caput Mortuum* black as a Coal, and whereof a great part was of a ſcarce to be expected fixtneſs in the fire.

To give a higher proof of the diſpoſition, that Oil of Vitriol has to let ſome of its parts grow fixt by combination with thoſe of an exceeding volatile additament, I mixed this liquour with an equal or double weight of highly rectified *Spirit of Wine*, and not onely after, but ſometimes without, previous digeſtion, I found, that the fluid parts of the mixture being totally abſtracted, there would remain a pretty quantity of a black Subſtance ſo fixt as to afford juſt cauſe of wonder.

And becauſe *Camphire* is eſteemed the moſt fugitive of conſiſtent bodies, in regard that, being but laid in the free air, without any help of the fire, it will fly *all* away; I tried, what Oil of Vitriol abſtracted from

Camphire would doe; and found at the bottom of the Retort a greater quantity than one would expect of a Subſtance as black as pitch, and almoſt as far from the volatility as from the colour of Camphire, though it appeared not, that any of the Gum had ſublim'd into the neck of the Retort.

From all which Inſtances it ſeems manifeſtly enough to follow, that in many caſes there needs nothing to make aſſociated particles, whether volatile or not, become fixt, but either to implicate or intangle them among themſelves, or bring them to touch one another according to large portions of their ſurfaces, or by both theſe ways conjoyntly, or by ſome others, to procure the firm Cohæſion of ſo many particles, that the reſulting Corpuſcles be too big or heavy to be, by the degree of fire wherein they are ſaid to be fixt, driven up into the Air.

FINIS.